

What is claimed is:

Sub  
A1  
1. A random access memory (RAM) incorporated display driver for displaying display data stored in the incorporated RAM on a display screen, comprising:

5 a RAM configured to store the display data to be displayed on the display screen;

a latch shift register configured to receive the display data read out from said RAM and if said display screen is intended to be scrolled in a horizontal direction, shift said read out display data depending on the scrolling direction and if said display screen is intended to be scrolled in a vertical direction, hold said read out display data; and

10 an access control circuit configured to read out the display data from said RAM and if said display screen is intended to be scrolled in a horizontal direction, write back the display data shifted by said latch shift register into an original region in said RAM and if said display screen is intended to be scrolled in a vertical direction, write back the display data held by said latch shift register into a region moved by the amount of  
15 the scroll from the original region of said RAM.  
20

2. The RAM incorporated display driver according to claim 1, wherein said access control circuit comprises:

a switching circuit configured to switch a direction for  
25 reading out the display data from said RAM serially to an opposite direction, if the display screen is intended to be scrolled vertically downward, to that of scrolling the display screen

vertically upward.

3. The RAM incorporated display driver according to claim 1, further comprising:

5 a first selecting circuit configured to select a region in a horizontal direction capable of being scrolled in the display screen, wherein said access control circuit supplies display data in a region selected by said first selecting circuit to said latch shift register.

10 4. The RAM incorporated display driver according to claim 1, further comprising:

15 a second selecting circuit configured to select a region in a vertical direction capable of being scrolled in the display screen, wherein said access control circuit supplies display data in a region selected by said second selecting circuit to said latch shift register.

20 5. The RAM incorporated display driver according to claim 3, wherein said first selecting circuit includes a shift register of the same bit number as that of one dot line of said RAM.

25 6. The RAM incorporated display driver according to claim 4, wherein said second selecting circuit includes a comparing circuit configured to compare a value of an address in a vertical direction to be scrolled with a

content of an address counter indicating a selected address  
in the vertical direction in said RAM.

7. The RAM incorporated display driver according to claim 1,  
wherein said display is a liquid crystal display (LCD).

8. An image display apparatus for displaying display data  
stored in the incorporated RAM, comprising:

a display;

a system driver for driving said display; and

a CPU for supplying a signal for controlling the display  
screen to said system driver, wherein said system driver  
includes:

a RAM configured to store the display data to be displayed  
on the display screen;

a latch shift register for receiving the display data read  
out from said RAM and if said display screen is intended to be  
scrolled in a horizontal direction, shift said read out display  
data depending on the scrolling direction and if said display  
screen is intended to be scrolled in a vertical direction, hold  
said read out display data; and

an access control circuit configured to read out the display  
data from said RAM and if said display screen is intended to  
be scrolled in a horizontal direction, write back the display  
data shifted by said latch shift register into an original region  
in said RAM and if said display screen is intended to be scrolled  
in a vertical direction, write back the display data held by

said latch shift register into a region moved by the amount of the scroll from the original region of said RAM.

9. The image display apparatus according to claim 8, wherein  
5 said access control circuit comprises:

a switching circuit configured to switch a direction for reading out the display data from said RAM to an opposite direction, if the display screen is intended to be scrolled vertically downward, to that of scrolling the display screen vertically upward.  
10

10. The image display apparatus according to claim 8, wherein said system driver further comprises:

a first selecting circuit configured to select a region in a horizontal direction capable of being scrolled in the display screen, wherein said access control circuit supplies display data in a region selected by said first selecting circuit to said latch shift register.  
15

11. The image display apparatus according to claim 8, wherein said system driver further comprises:

a second selecting circuit configured to select a region in a vertical direction capable of being scrolled in the display screen, wherein said access control circuit supplies display data in a region selected by said second selecting circuit to said latch shift register.  
20  
25

12. The image display apparatus according to claim 10, wherein said first selecting circuit includes a shift register of the same bit number as that of one dot line of said RAM.

5 13. The image display apparatus according to claim 11, wherein said second selecting circuit includes a comparing circuit configured to compare a value of an address in a vertical direction to be scrolled with a content of an address counter indicating a selected address in the vertical direction in said RAM.

10 14. The image display apparatus according to claim 8, wherein said display is a liquid crystal display (LCD).

15 15. A memory incorporated display driver for displaying display data stored in the incorporated memory on a display screen, comprising:

a memory configured to store the display data to be displayed on the display screen;

20 a latch shift unit configured to receive the display data read out from said memory and if said display screen is intended to be scrolled in a lateral direction, shift said read out display data depending on the scrolling direction and if said display screen is intended to be scrolled in a longitudinal direction, hold said read out display data; and

25 an access control unit configured to read out the display data from said memory and if said display screen is intended to be scrolled in a lateral direction, write back the display

data shifted by said latch shift unit into an original region  
in said memory and if said display screen is intended to be scrolled  
in a longitudinal direction, write back the display data held  
by said latch shift unit into a region moved by the amount of  
5 the scroll from the original region of said memory,

whereby said written back display data is supplied to said  
display screen by said access control unit.

16. The memory incorporated display driver according to claim  
15, wherein said access control unit comprises:

a switching unit configured to switch a direction for  
reading out the display data from said memory serially to an  
opposite direction, if the display screen is intended to be  
scrolled longitudinally downward, to that of scrolling the  
15 display screen longitudinally upward.

17. The memory incorporated display driver according to claim  
15, further comprising:

a first selecting unit configured to select a region in  
20 a lateral direction capable of being scrolled in the display  
screen, wherein said access control unit supplies display data  
in a region selected by said first selecting unit to said latch  
shift unit.

18. The memory incorporated display driver according to claim  
15, further comprising:

a second selecting unit configured to select a region in

a longitudinal direction capable of being scrolled in the display screen, wherein said access control unit supplies display data in a region selected by said second selecting unit to said latch shift unit.

5

19. The memory incorporated display driver according to claim 17, wherein said first selecting unit includes a shift register of the same bit number as that of one dot line of said memory.

10

20. The memory incorporated display driver according to claim 18, wherein said second selecting unit includes a comparator configured to compare a value of an address in a longitudinal direction to be scrolled with a content of an address counter indicating a selected address in the longitudinal direction in said memory.

15

add  
A4  
add  
B61